69788
S/055/59/000/06/15/027
B006/B005

24.2200

AUTHORS: Smol'kov, N. A., Grekov, V. M.

TITLE: Some Properties of the $Li_2O.xFe_2O_3$ System

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1959, No. 6, pp. 137 - 141

TEXT: Lithium ferrites of this type are very important in technology since their solid solutions with other ferrites form magnetic materials having a small tangens of the loss angle within a range of some tens of Mc/sec, and good time- and impulse characteristics. The crystal structure of these ferrites has been insufficiently investigated. A cubic lattice of the rock-salt type was found as well as a tetragonal modification - the transition point was found to be at 660°. The modification $Li_2O.Fe_2O_3$ has its transition point far below 660°. A phase with spinel structure was also found for ferrites with x = 2,3,4. $Li_2O.5Fe_2O_3$ has a spinel structure with a = 8.309 or 8.37 A. A number of further details taken from publications are mentioned. Subsequently, the authors present experimental results concerning the determination of the Curie point, and the static magnetic

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Some Properties of the $Li_2O.xFe_2O_3$ System

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characteristics of ferrites (x = 1,2.,.6). Θ_K was determined from the change in inductance of a ferrite-core coil on heating from -196 to +700°. Fig. 1 shows the dependence of the magnetic permeability μ on H for all x-values, Fig. 2 the dependence of the primary and maximum permeability μ_o and μ_{max}, and the coercive force H_c of ferrites, on their composition, Fig. 3 the dependence of the magnetic residual and maximum induction B_r and B_m of ferrites on their composition, and Fig. 4 the dependence of the angle of rotation φ of the polarization plane on H. Further, the authors investigated the high-frequency properties of ferrites. The Faraday effect was investigated at 9370 Mc/sec by the method published in Ref. 9. Fig. 5 shows the dependence of the angle of rotation of the polarization plane on the composition at H = const for three different temperatures. It is shown that the compound $Li_2O.5Fe_2O_3$ is the most magnetoactive one in the range of superhigh frequencies. This compound also shows the smallest coercive force, and maximum values of μ_o and μ_{max}, B_r and B_m, and φ. A device for measuring the phase shift $\Delta\varphi$ and the damping δ of electromagnetic waves passing through a ferrite plate is described (Fig. 6). If $Q = \Delta\varphi/\delta$ is defined as the quality factor of ferrite, the compound with x = 5 also has the maximum

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Some Properties of the $Li_2O.xFe_2O_3$ System

S/055/59/000/06/15/027
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Q-value as is shown by Fig. 7. There are 7 figures, 1 table, and 20 references, 4 of which are Soviet.

ASSOCIATION: Kafedra magnetizma (Chair of Magnetism)

SUBMITTED: January 22, 1959

Card 3/3

69164

24.7900

S/139/59/000/06/022/034
E201/E191

AUTHORS: Smol'kov, N.A., and Day Do-shen

TITLE: Some Properties of Yttrium and Gadolinium Ferrite Garnets

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1959, Nr 6, pp 145-151 (USSR)

ABSTRACT: The authors measured the static (d.c.) magnetic properties and high-frequency magnetic and dielectric properties of two garnet ferrites: yttrium ferrite ($3Yt_2O_3.5Fe_2O_3$), which has not a compensation point, and gadolinium ferrite ($3Gd_2O_3.5Fe_2O_3$) which has a compensation point. The compensation point is a temperature, T_{comp}, at which the saturation magnetization, M_s, becomes zero. Samples were prepared by the usual ceramic techniques from Fe_2O_3, Yt_2O_3 and Gd_2O_3. The samples were subjected to a pressure of 3 tons/cm^2 and were fired for 3 hours at 1300 °C in air. Yttrium garnet had a Curie point θ_K at 287 °C; gadolinium garnet at θ_K = 291 °C and a compensation point at T_{comp} = 14 °C. Some of the results are given in Figs 1 (Yt garnet) and 2 (Gd garnet). These figures show the

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Some Properties of Yttrium and Gadolinium Ferrite Garnets

temperature dependences of the initial (μ_o) and maximum (μ_{max}) permittivities, coercive force (H_c), residual induction (B_r) and maximum induction (B_m) reached in maximum fields of H = 40 Oe produced by windings on the ferrite toroids. B_m and B_r of both ferrites fall monotonically with temperature, in agreement with Pauthenet's observations (Refs 2, 8, 9). The temperature dependences (between -200 and +300 °C) of μ_o, μ_{max} and H_c of Yt garnet have the form usual for ferromagnetics without a compensation point (Fig 1); the same dependences of Gd garnet (Fig 2) are anomalous because of the presence of T_{comp}. This anomaly can be explained as follows. The saturation magnetization M_s of Gd garnet falls, starting at -196 °C, and reaches zero at T_{comp} = 14 °C, and consequently the permeabilities decrease to $\mu_o = \mu_{max} = 1$ and the coercive force H_c rises from 5 Oe at -196 °C to 21.8 Oe at 14 °C. The value of H_c at T_{comp} was obtained as the point of intersection of the curves $H_c = f(T)$ obtained at temperatures lower and higher than T_{comp}. The rise of

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Some Properties of Yttrium and Gadolinium Ferrite Garnets

H_c is mainly due to the fall in M_s. On heating above T_{comp} the value of H_c decreases first very sharply (in the region where M_s rises) and then it falls more slowly. The permittivities μ_o and μ_{max} rise above T_{comp}, reaching their maximum values at the Curie point. Polder (Ref 19) and Hogan (Ref 20) showed that a high-frequency magnetic field h and the resultant induction b in a medium magnetized to saturation along the OZ-axis are related by a tensor expression

$$b = T_{ij}h, \qquad (1)$$

where T_{ij} is the permeability tensor:

$$T_{ij} = \begin{vmatrix} \mu & -iK & 0 \\ +iK & \mu & 0 \\ 0 & 0 & \mu_z \end{vmatrix} \qquad (2)$$

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In Eq (2) the tensor components are $\mu = \mu' - i\mu''$, $K = K' - iK''$, $\mu_z = \mu_z' - i\mu_z''$. From these tensor

Some Properties of Yttrium and Gadolinium Ferrite Garnets

components the effective complex permeability $\mu_\perp$ can be found using:

$$\mu_\perp = u'_\perp - iu''_\perp = \frac{\mu^2 - K^2}{\mu} \qquad (3)$$

Employing the technique developed by Vasil'yev (Ref 21) the authors determined the components of T_{ij}, the complex effective permeability $\mu_\perp$ and the complex permittivity $\varepsilon = \varepsilon' - i\varepsilon''$ of both ferrites at 9370 Mc/s; the results are given in Figs 3-8. Figs 3 and 4 give dependences of μ'_z, $\mu'_\perp$ and $\mu''_\perp$ on the magnetizing field H (up to 2000 Oe) at three temperatures: +16, +130 and +200 °C for Yt garnet (Fig 3) and +45, +130 and +200 °C for Gd garnet (Fig 4). With increase of the field H the magnitude of the real part of the effective permeability $\mu'_\perp$ decreases, due to its dispersion nature, in agreement with Pauthenet's theory (Ref 19). It can be shown theoretically that when H is fixed, the value of $\mu'_\perp$ rises on decrease of M_s, and conversely. The experimental results obtained by the

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Some Properties of Yttrium and Gadolinium Ferrite Garnets

authors (Figs 3-6) confirm this (Figs 5 and 6 show the temperature dependences of $\mu'_\perp$ and $\mu''_\perp$ of Yt and Gd garnets respectively between 0 and 200 °C). For Yt garnet the value of $\mu'_\perp$ rises on increase of temperature from +16 to +200 °C, while for Gd garnet the value of $\mu'_\perp$ falls between +45 and +130 °C, since M_s rises in this region (cf. Fig 2). On further heating between +130 and 200 °C the real part of permeability of Gd garnet rises, because M_s falls at these temperatures. Values of μ'_z of both garnets are practically independent of the applied field (Figs 3, 4). The results for $\mu'_\perp$ and μ'_z are in agreement with those obtained by Nemarich and Cacheris (Ref 16) for yttrium ferrite garnet and for MgMn and Ni ferrites. The imaginary part of permeability $\mu''_\perp$, which represents effective magnetic losses, rises in both garnets with increase of the field H, indicating approach to ferromagnetic resonance (Figs 3, 4), and falls on increase of temperature (Figs 5, 6). The value of μ''_z could not be determined because of its low value. Fig 7 gives dependence of the real and imaginary parts of

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the tensor components μ and K on the field H (up to 2000 Oe) for Yt garnet: these curves show that μ' falls with increase of H, and K', μ'', K" all rise with increase of H. Measurements on Gd garnet showed that $\mu' = \mu'_{\perp}$, $\mu'' = \mu''_{\perp}$ and K = 0. Fig 8 represents the temperature dependences of the real (ε') and imaginary (ε'') parts of permittivity of both garnets between 0 and 200 °C. All these quantities are practically independent of temperature: $\varepsilon' = 6\text{-}7$, as in spinel-type ferrites, and dielectric losses, represented by ε'', are very low (0.001-0.002).

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There are 8 figures and 21 references, of which 1 is Soviet, 13 English, 5 French, 1 translation from French into Russian and 1 international.

ASSOCIATION: Moskovskiy gosuniversitet imeni M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: January 28, 1959

18.6100
24.2200

67686
SOV/126-8-4-8/22

AUTHORS: Smol'kov, N.A., and Gushchina, S.A.

TITLE: Nickel-Cadmium Ferrites

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 4, pp 557-561 (USSR)

ABSTRACT: The authors made ferrites of eleven compositions by a ceramic method with the general formula $Ni_{1-x}Cd_xFe_2O_4$, where x varies from 0 to 1 in 0.10 intervals. The basic raw materials were the higher oxides Fe_2O_3 and CdO of the "ChDA" class and the lower nickel oxide NiO of the "Ch" class. The specimens were pressed at a pressure of 3 t/cm^2. In order to obtain material with high magnetic properties, the charger after milling, drying and sieving was given a preliminary annealing at 950 °C for 3 hours, and was then ground again and mixed with a plasticizer (polyvinal alcohol). From the pressed powder specimens were made which were annealed at 1245 °C for 3 hours. Specimens made without preliminary annealing exhibited low magnetic properties. The Curie point Θ_k of the ferrites was determined by the fall in induction of a ferrite core-coil on heating, and the static properties (initial and

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maximum magnetic permeabilities, μ_o and μ_{max}, coercive force H_c, residual and maximum magnetic inductions, B_r and B_m), were measured in toroidal specimens by means of a ballistic instrument. The results of measurements of the above properties in relation to composition are shown in Figs 1-4. By means of an earlier described method (Ref 8) the authors studied the Faraday effect in cylindrical ferrite specimens of 55 mm length and 5 mm diameter at room temperature at a frequency of 9370 megahertz. Fig 5 shows a curve for the dependence of the angle of rotation of the polarisation plane φ of $Ni_{1-x}Cd_xFe_2O_4$ ferrites at a fixed magnetising field H of 460 oersted, on composition. Simultaneously the high frequency quality Q of ferrites was determined at a fixed magnetising field of H = 600 oersted. The measurements were carried out on plate-like ferrite needles, 3 x 7.5 x 95 mm, by means of an apparatus, the layout of which is shown in Fig 6. In this apparatus the phase shift $\Delta\varphi$ and the damping δ (in decibels)

Nickel-Cadmium Ferrites

were determined and from the results obtained the high frequency quality $Q = \Delta\varphi/\delta$ was calculated. In Fig 7 the dependence of Q of the $Ni_{1-x}Cd_xFe_2O_4$ on composition at a frequency of 9370 megahertz at a fixed magnetisation field of $H = 600$ oersted, is shown. The authors arrive at the following conclusions. In solid solutions of nickel and cadmium ferrites the Curie point decreases steadily with increase in the concentration of cadmium ferrite in the solution, the initial and maximum magnetic permeabilities increase, reaching a maximum in the range of 60% cadmium ferrite concentration and then fall sharply; the coercive force attains a minimum for a composition of 50% cadmium ferrite; the residual and maximum magnetic inductions attain a maximum in the range of 20% cadium ferrite concentration; the compositions $Ni_{0.9}Cd_{0.1}Fe_2O_4$ and $Ni_{0.8}Cd_{0.2}Fe_2O_4$ have maximum values of angle of rotation of the polarisation plane φ and high frequency quality Q.

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There are 7 figures and 8 references, of which 6 are Soviet, 1 is French and 1 is European (S. Ceram. Ind.)

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Nickel-Cadmium Ferrites

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova
(Moscow State University imeni M.V. Lomonosov)

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4

SUBMITTED: February 12, 1959

SMOL'KOV, N.A.

Properties of copper cadmium ferrates. Vest Mosk. un. Ser. mat., mekh., astron., fiz., khim. 14 no.2:85-91 '59 (MIRA 13:3)

1. Kafedra magnetizma Moskovskogo gosuniversiteta.
(Copper cadmium ferrates)

SMOL'KOV, N.A.;YEREMKINA, V.A.

Effect of magnesial aluminate on the properties of magnesium ferrate. Vest Mosk. un. Ser. mat., mekh., astron., fiz., khim. 14 no.2:93-99 '59 (MIRA 13:3)

1. Kafedra magnetizma Moskovskogo gosuniversiteta.
(Magnesium aluminates) (Magnesium ferrate)

AUTHORS: Smol'kov, N. A., Simnov, Yu. P. SOV/48-23-3-7/34

TITLE: Properties of Solid Solutions $NiFe_2O_4$ - $MgFe_2O_4$ (Svoystva tverdykh rastvorov $NiFe_2O_4$ - $MgFe_2O_4$)

PUBLICATION: Izvestiya Akademii nauk SSSR. Seriya fizich[illegible], Vol 23, Nr 3, pp 307-310 (USSR)

ABSTRACT: In the present paper the authors investigate the structural, magnetic, and high-frequency properties of the nickel-magnesium-ferrites of stoichiometric composition. The samples were produced from oxides by a sintering of 3 hours at 1500°. The molecular weights and the colors of the solutions are given in the table. The values found for the constants of the crystal lattice of the solutions are:

solution Nr	lattice constant a in kX
1	8,321 ± 0.001
2	8,328 ± 0.001
3	8,341 ± 0.001
4	8,349 ± 0.001
5	8,362 ± [illegible]

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In figure 1 the curve of dependence of the value a on the $MgFe_2O_4$-content in the solution is given. The absolute values a of the solutions proved to be slightly lower than those given in reference 6:

$NiFe_2O_4$ - 8.34 kX; $MgFe_2O_4$ - 8.37 kX.

In order to determine the type of the spinels of the solutions investigated the relations of the line intensity I_{400}/I_{422} under consideration of the absorption-, polarization- and the Lorentz factor were determined (Fig 2) by means of tables (Ref 8). The values of I_{400}/I_{422} which were experimentally found and entered in the diagram show within the possible error limits in the photoprocess and in the measurement by means of the photometer that the solid solutions in the system $NiFe_2O_4$ - $MgFe_2O_4$ have the structure of an inverse spinel. As was demonstrated already earlier the Curie point θ_K of the solid solutions decreases linearly from 585° for nickel ferrite, to 325° for magnesium ferrite.

In figure 3 the dependences of the initial and the maximum magnetic permeability μ_n and μ_{max} on the composition and on figure 4 the curves of the coercive force H_c, of remanent induction B_r and of the maximum induction B_{max} are given. As may be seen μ_n, μ_{max}, B_r and B_{max} decrease monotonously at a higher magnesium-ferrite-concentration in solution whereas H_c first increases until the solution $N_{0.5}Mg_{0.5}Fe_2O_4$ is attained and then practically remains unchanged. The Faraday effect was investigated according to the method described earlier (Refs 9 - 10). The curves of dependence of the rotation angle of the polarization plane φ and the high-frequency losses δ on the composition are shown in figure 5. From these curves it may be seen that the angle monotonously decreases with the increase of the magnesium-ferrite content in solution while the losses δ have their minimum at $Ni_{0.75}Mg_{0.25}Fe_2O_4$. The reduction of the φ-angle may be caused by the fact that the saturation magnetization of the solutions decreases from nickel to magnesium-ferrite.

Properties of Solid Solutions $LiFe_5O_8$ - $MgFe_2O_4$ SOV/48-23-3-7/31

There are 5 figures, 1 table, and 10 references, 5 of which are Soviet.

ASSOCIATION: Kafedra magnetizma Fizicheskogo fakul'teta i kafedra neorganicheskoy khimii khimicheskogo fakul'teta Moskovskogo gos. universiteta im. M. V. Lomonosova (Chair of Magnetism of the Physics Department and Chair of Inorganic Chemistry of the Chemical Department of the Moscow State University im. M. V. Lomonosov)

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24(3)

AUTHORS: Smol'kov, N. A., Belov, V. F. SOV/48-23-3-15/34

TITLE: Several Properties of Ferrites Under Pulse Conditions (Nekotoryye svoystva ferritov v impul'snom rezhime)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 3, pp 357-360 (USSR)

ABSTRACT: The pulse device shown in figure 1 as a block diagram was used in the present investigation for examining the duration of magnetic reversal. The duration of magnetic reversal was visually read from the width of the signal appearing on the screen of the synchroscope. Figure 2 shows the isothermal lines $H_m = f\left(\frac{1}{\tau}\right)$ for industrial ferrite Nr 1, which is used in computers. Figure 3 gives the temperature dependences H_o and S_w. H_o denotes the value of the threshold field, S_w the coefficient of magnetic reversal. In the case of rising temperature the two values decrease. This may be due to the decrease of the elastic tensions and the reduction of the anisotropy constant in the material. The isothermal lines $H_m = f\left(\frac{1}{\tau}\right)$ for

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ferrite Nr 2 are given in figure 4. Ferrite Nr 2 was produced by sintering the oxides at 1,300° and subsequent tempering. The composition is $MgO.3MnO.3Fe_2O_3$. Figure 5 shows the temperature dependence of the threshold field and of the coefficient of magnetic reversal of ferrite Nr 2. The curves indicate the maximum value of the threshold field to be in the range of -117°. Such an anomaly is likely to be due to the existence of phase transitions taking place in some ferrites. Figures 2 and 4 show that the range of linear dependence $H_m = f\left(\frac{1}{\tau}\right)$ is in the case of ferrite Nr 1 in weaker fields than in the case of ferrite Nr 2 and that consequently ferrite Nr 1 is more economical. H_m denotes the external field, τ the duration of magnetic reversal. There are 5 figures and 15 references, 2 of which are Soviet.

ASSOCIATION: Kafedra magnetizma fizicheskogo fakul'teta Moskovskogo gos. universiteta im. M. V. Lomonosova (Chair of Magnetism of the Physics Department of Moscow State University imeni M. V. Lomonosov)

307/48-23-3-18/34

24(3)

AUTHORS: Smol'kov, N. A., Fomenko, Ye. I.

TITLE: Some Properties of Ferrites at Super High Frequencies (Nekotoryye svoystva ferritov na sverkhvysokikh chastotakh)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 3, pp 377-379 (USSR)

ABSTRACT: As Polder (Ref 1) has theoretically shown , a high-frequency plane-polarized electromagnetic oscillation is decomposed into two waves when passing through a magnetized ferromagnetic: one wave is left handed circularly polarized and one right-handed. The velocities of propagation in both waves are different. For this reason the resulting plane-polarized wave which emerges from the ferromagnetic shows a rotation of the polarization plane by φ (compared to the incident wave) - i.e. a Faraday effect may be observed which is similar to the optical one. Roberts (Ref 2) and Hogan (Ref 3) proved this experimentally with ferrites. Six diagrams are discussed. In the first diagram the rotation of the polarization plane in dependence of the external magnetic field H in a cylindrical magnesium-manganese-ferrite sample ($Mg_{0.75}Mn_{0.25}Fe_2O_4$)

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Some Properties of Ferrites at Super High Frequencies

at a frequency of 9350 Megacycles is shown. In the second diagram the same is demonstrated for magnesium-nickel-manganese-ferrite. In the diagram 3a the damping of the polarized wave is shown in dependence of the external magnetic field (φ has a sharp maximum), and in 3b the dependence of the ellipticity on the external magnetic field is shown; d shows a minimum at the same place where φ has its maximum. The fourth diagram shows the dependence of the rotation of the polarization plane on the external magnetic field H for 6 different magnesium-manganese-ferrites. In the fifth diagram the angle of rotation of the polarization plane is shown for three different temperatures as a function of the mixing proportion between $MnFe_2O_4$ and $MgFe_2O_4$ at a field strength of H_o = 460 Oe. There are 5 figures and 9 references, 3 of which are Soviet.

PHASE I BOOK EXPLOITATION SOV/4893

Vsesoyuznoye soveshchaniye po fizike, fiziko-khimicheskim svoystvam ferritov i fizicheskim osnovam ikh primeneniya. 3d, Minsk, 1959

Ferrity; fizicheskiye i fiziko-khimicheskiye svoystva. Doklady (Ferrites; Physical and Physicochemical Properties. Reports) Minsk, Izd-vo AN BSSR, 1960. 655 p. Errata slip inserted. 4,000 copies printed.

Sponsoring Agencies: Nauchnyy sovet po magnetizmu AN SSSR. Otdel fiziki tverdogo tela i poluprovodnikov AN BSSR.

Editorial Board: Resp. Ed.: N. N. Sirota, Academician of the Academy of Sciences BSSR; K. P. Belov, Professor; Ye. I. Kondorskiy, Professor; K. M. Polivanov; Professor; R. V. Telesnin, Professor; G. A. Smolenskiy, Professor; N. N. Shol'ts, Candidate of Physical and Mathematical Sciences; E. M. Smolyarenko; and L. A. Bashkirov; Ed. of Publishing House: S. Kholyavskiy; Tech. Ed.: I. Volokhanovich.

PURPOSE: This book is intended for physicists, physical chemists, radio electronics engineers, and technical personnel engaged in the production and use of ferromagnetic materials. It may also be used by students in advanced courses in radio electronics, physics, and physical chemistry.

COVERAGE: The book contains reports presented at the Third All-Union Conference on Ferrites held in Minsk, Belorussian SSR. The reports deal with magnetic transformations, electrical and galvanomagnetic properties of ferrites, studies of the growth of ferrite single crystals, problems in the chemical and physicochemical analysis of ferrites, studies of ferrites having rectangular hysteresis loops and multicomponent ferrite systems exhibiting spontaneous rectangularity, problems in magnetic attraction, highly coercive ferrites, magnetic spectroscopy, ferromagnetic resonance, magneto-optics, physical principles of using ferrite components in electrical circuits, anisotropy of electrical and magnetic properties, etc. The Committee on Magnetism, AS USSR (S. V. Vonsovskiy, Chairman) organized the conference. References accompany individual articles.

Ferrites (Cont.) SOV/4893

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SMOL'KOV, N.A.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001651720007-2"

S/196/62/000/020/006/021
E194/E155

AUTHORS: Pakhomov, A.S., and Smol'kov, N.A.

TITLE: Ferrites. Their structure and certain physical properties

PERIODICAL: Referativnyy zhurnal, Elektrotekhnika i energetika, no.20, 1962, 3, abstract 20 B 14. (In collection: 'Antiferromagnetizm i ferrity' ("Antiferromagnetism and ferrites"), M., AN SSSR, 1962, 119-213).

TEXT: Recent experimental and scientific observations of the crystalline structure and certain properties of ferrites are systematically presented, in three chapters. The first considers the detailed structure and properties of different crystalline lattices (structure of spinel, garnet, magnetoplumbite, rock salt, etc), the relationship between structure and sintering conditions and the composition of the initial charge, and also the crystal chemistry of ferrites. The second chapter presents the theory of magnetism of ferrites, the semi-classical theory of Néel, the theory of Yafet and Kittel (the generalised Néel's theory), and quantum theory. The third chapter, occupying half the total

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Ferrites. Their structure and ... S/196/62/000/020/006/021
E194/E155

article, deals with the physical properties (thermal, magnetic and electric) of ferrites. Experimental data are given about the presence of conversion points in ferrites which accompany the occurrence of peaks on the temperature curves of specific heat and coefficient of thermal expansion. Calculations of molecular magnetic moments of saturation of ferrites with spinel and garnet lattice on the basis of Néel's theory are made and compared with experimental results, and discrepancies are discussed. The magnetic properties of mixed ferrites with spinel, garnet and magnetoplumbite structure are considered. The influence of the sintering conditions (sintering temperature, atmosphere, method of cooling) on the static magnetic characteristics and their temperature relationships are shown. The constants of magnetic anisotropy of single crystals of different ferrites are tabulated and their dependence on the concentration of Fe^{3+} ions in the spinel lattice and on the concentration of Co ions in Ferroxplana* is examined. Finally, the article examines the electrical conductivity of ferrites. 41 illustrations, 303 references.

* Ferroxplana is a trade name (Philips, of Eindhoven).

Card 2/2 [Abstractor's note: Complete translation.]

L 13104-66 EWT(m)/EWP(t)/EWP(b) LJP(c) JD/JG

ACC NR: AP5025794 SOURCE CODE: UR/0363/65/001/009/1564/1565

4/2 B

AUTHOR: Smol'kov, N. A.; Dobrovol'skaya, N. V.

ORG: All-Union Scientific Research Institute of Mineral Raw Materials (Vsesoyuznyy nauchno-issledovatel'skiy institut mineral'nogo syr'ya)

TITLE: Magnetic susceptibility of lanthanum, neodymium, and gadolinium oxides 27 27 27 27

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 9, 1954, 1564-1565

TOPIC TAGS: lanthanum oxide, neodymium oxide, gadolinium oxide, magnetic susceptibility, paramagnetism, diamagnetism, magnetic moment

ABSTRACT: The magnetic susceptibility χ of the oxides La_2O_3, Nd_2O_3, and Gd_2O_3 was measured by the Faraday method at temperatures of 20-800°C. La_2O_3 has a constant diamagnetic susceptibility $\chi_{diam} = -0.23 \cdot 10^{-6}$ cm^3 g^{-1} over the entire temperature range. Nd_2O_3 is paramagnetic but its temperature dependence deviates from the Curie-Weiss law particularly at high temperatures; this is due to the effect of the energy levels of the lower multiplet which are located above the ground state $^4I_{9/2}$ and

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ACC NR: AP5025794

whose contribution to the paramagnetism increases with T. The experimental effective magnetic moment of the Nd^{3+} ion is (in Bohr magnetons) μ_{eff} = 3.79 (theoretical value 3.68) for the free ion and 3.67 for the interacting ion. The susceptibility of Gd_2O_3 conforms rigorously the Curie-Weiss law because the paramagnetism of Gd^{3+} is due solely to the magnetic moment of the ion in the ground state $^8S_{7/2}$. $\chi_{para} = 140 \cdot 10^{-6}$ $cm^3\ g^{-1}$ at 20°C. Experimental μ_{eff} for Gd^{3+} (in Bohr magnetons) is 7.95 (theoretical value 7.94). Orig. art. has: 2 figures, 1 formula.

SUB CODE: 07/ SUBM DATE: 16Apr65/ ORIG REF: 000/ OTH REF: 002

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Card 2/2

SMOL'KOV, V., kand.filosofskikh nauk

Socialist competition is the general feature of our social development. Komm.Vooruzh.Sil 3 no.24:8-16 D '62. (MIRA 15:12)

(Russia--Armed forces) (Socialist competition)

[redacted], V. G.

Dissertation defended for the degree of Candidate of Philosophical Sciences at the Institute of Philosophy 1962

"Socialist Competition -- A Principle of the Development of the Soviet Society."

Vestnik Akad. Nauk, No. 4, 1963, pp 119-145

USSR/Zooparasitology. Parasitic Worms. Helminths of Men. G

Abs Jour: Ref Zhur-Biol., No 17, 1958, 76990.

Author : Smol'kov, V. T.
Inst :
Title : A Case of Simultaneous Echinococcosis of the Heart and Spleen.

Orig Pub: Zdravookhr. Kazakhstana, 1957, No 10-11, 109-110.

Abstract: No abstract.

Card : 1/1

10

SMOL'KOV, V.T.

Two cases of abdominal pregnancy diagnosed as tumor of the abdominal cavity. Zdrav. Kazakh. 22 no.2:75-76 '62. (MIRA 15:4)

1. Iz 1-oy Ust'-Kamenogorskoy gorodskoy bol'nitsy.
(PREGNANCY, EXTRA-UTERINE) (ABDOMEN--TUMORS)

SMOL'KOV, V.T.; BABAYTSEV, V.A.; PISMAREV, V.V.

Analysis of sudden death in the home. Zdrav. Kazakh. 22 no.5:46-48 '62. (MIRA 15:6)

1. Iz Vostochno-Kazakhstanskogo oblastnogo byuro sudebno-meditsinskoy ekspertizy.
(UST'-KAMENOGORSK--DEATH--CAUSES)

BERKA,A.; SMOLKOVA,E.; BOCANOVSKI,E.

Indirect gasometric determination of urotropin. Cesk. farm. 13 no.3:96-99 Mr'64.

1. Katedra analyticke chemie KU, Praha.

ACC NR: AP7001392 (A) SOURCE CODE: UR/0413/66/000/021/0061/0061

INVENTORS: Smol'kova, V. S.; Yemel'yanov, N. M.; Yampol'skaya, E. G.; Smirnova, I. A.

ORG: none

TITLE: A method for obtaining an electrode paste for lead batteries. Class 21, No. 187857

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 21, 1966, 61

TOPIC TAGS: lead, storage battery, urea, battery

ABSTRACT: This Author Certificate presents a method for obtaining an electrode paste for lead batteries. The paste is based on lead powder and is deposited on plates and dried. To increase the capacity of the battery, the lead powder is mixed with urea. To this dry mixture rubber cement is added. The amount of urea introduced may range from 3 to 20%.

SUB CODE: 10/ SUBM DATE: 24May63

Card 1/1 UDC: 621.3.035.4

CZECHOSLOVAKIA

SMOLKOVA, E; KRISTOFIKOVA, L; FELTL, L; GRUBNER, O

1. Institute of Physical Chemistry, Czechoslovak Academy of Sciences, Prague (for Grubner); 2. Institute of Analytical Chemistry, Charles University, Prague (for others)

Prague, Collection of Czechoslovak Chemical Communications, No 2, February 1966, pp 450-456

"Determination of the surface of powdery substances by the method of thermal desorption, using organic vapors as the sorbates."

[illegible], [illegible]

[illegible]elial "reserve" cells in the mucous membrane of the cervix [illegible]. Trudy KirgNIIAGP no.2:63-64 '65. (MIRA 18:11)

1. Iz kafedry patologicheskoy anatomii (zav. - prof. B.F.Malyshev) K[illegible]skogo gosudarstvennogo meditsinskogo instituta.

MIKHEYEVA, O.N.; ZHEBRONOVA, Z.A.; POPOVA, L.A.; KAMENSKIY, I.N. [deceased]; BEL'KIND, M.G.; TSVELEVA, I.A.; SMOL'NAYA, L.M.; KADYKOVA, N.F.; KASHITSYNA, A.D.

Biosynthesis of tetracycline on enriched media. Med.prom. 14 no.1:31-34 Ja '60. (MIRA 13:5)

1. Moskovskiy zavod meditsinskikh preparatov No.1 i Vsesoyuznyy nauchno-issledovatel'skiy institut antibiotikov.
(TETRACYCLINE)

Smolnický, T.

AUTHORS: Mäsiar, P and Smolnický, T. CZ/8/52(82)/10-25/39

TITLE: Haemoglobin II. A Note on the Problem of Similarities in the Structures of the Protein Component of Horse and Human Haemoglobin. Preliminary Communication (O hemoglobine II. K otázke podobnosti v štruktúre bielkovinnej zložky l'udského a konského hemoglobínu)

PERIODICAL: Chemické Listy, 1958, Vol 52(82), Nr 10, pp 1991-1992 (Czechoslovakia) + 2 plates.

ABSTRACT: It was considered that the non-specific hydrolysis of haemoglobin by hydrochloric acid was responsible for the small number of arginine and histidine peptides. Trypsin hydrolysis was chosen because of its specificity. Trypsin, purified by repeated crystallisation was used at pH 7.5 (30° C, 24 hours). Paper chromatography (n-butanol-pyridine-acetic acid-water (30:20:6:24) - multiple development (x2) and paper electrophoresis (pyridine-acetate buffer; pH 5.6; 40 V/cm; 2 hours) were used to study the products of hydrolysis. The eluates from paper electrophoretograms were also prepared for study. Although fairly closely related in structure, they differed mainly in those peptides containing histidine (Pauly reagent used for

Card 1/2

location). Although there are 33 histidine residues few were found in peptide form in the hydrolysates and it is suggested that they play a role in the formation of the complex with haem and in the reversible bonding of oxygen in the haemoglobin molecule. There are 4 figures, 11 references, 6 of which are Czech and 5 English.

ASSOCIATION: Biochemický ústav, lekárska fakulta, Komenského univerzita, Košice (Biochemistry Department, Medical Faculty, Komenský University, Košice)

SUBMITTED: April 14, 1958

Card 2/2

MASIAR, P.; SMOLNICKY, T.

On hemoglobin. Part 14 : Investigation on the neutral and weakly basic fraction of the tryptic digest of human and horse hemoglobin by chromatography on zerolit 225 and high-voltage electrophoresis. Coll Cz Chem 27 no.8:2018-2019 Ag '62.

1. Department of Biochemsitry, P.J. Safarik University, Kosice.

SMOL'NIK, A.Yu., inzh.

Automatic control system of the main engine on the motorship "Kimovsk". Sudostroenie 30 no.9:42-44 S '64.
(MIRA 17:11)

SMOL'NIK, Yu.Ye.; YAMPOL'SKIY, N.G.; GUSLENKO, V.I.

Application of mechanical vibrations in the oxidation of technical paraffins to synthetic fatty acids. Khim. i tekh.topl. i masel 10 no.11:26-28 N '65.

(MIRA 19:1)

1. UkrNIIgiproneft'.

SMOL'NIKOV, A.

Our chapter in the book of the Revolution. IUn.tekh. 3 no.10: 3-7 O '58. (MIRA 11:11)

(Communist Youth League)

SMOL'NIKOV, B.A.

Calculating natural vibrations of a closed frame system with a cyclic symmetry. Trudy LPI no.210:213-219 '60. (MIRA 13:11)
(Structural frames--Vibration)

ACCESSION NR: AP4013391 S/0040/64/028/001/0171/0174

AUTHOR: Smol'nikov, B. A. (Leningrad)

TITLE: Motion of a solid body under the influence of the rotation of an internal flywheel

SOURCE: Prikladnaya matematika i mekhanika, v. 28, no. 1, 1964, 171-174

TOPIC TAGS: solid body, rotation, flywheel, nonsymmetric body, pure rotation, moment of inertia, kinetic moment

ABSTRACT: The author investigates the solution of the problem of finite rotation of a nonsymmetric solid body under the influence of the rotation of an internal flywheel whose axis is arbitrarily fixed in the body. He shows that in the general case of rotation of a flywheel about an arbitrary axis the carrying body performs pure rotation about another axis, called the concommitant axis. He derives formulas for determining the axis of the flywheel in the body according to a given magnitude of spatial rotation of the carrying body. Orig. art. has: 30 formulas and 1 diagram.

Card 1/2

ACCESSION NR: AP4013391

ASSOCIATION: none

SUBMITTED: 16Oct63 DATE ACQ: 26Feb64 ENCL: 00

SUB CODE: PH NO REF SOV: 002 OTHER: 000

Card 2/2

ACCESSION NR: AP4043292 S/0040/64/028/004/0725/0734

AUTHOR: Smol'nikov, B. A. (Leningrad)

TITLE: Optimal modes of braking the rotary motion of a symmetrical body

SOURCE: Prikladnaya matematika i mekhanika, v. 28, no. 4, 1964, 725-734

TOPIC TAGS: jet motor, optimal operational mode, rotary motion, Pontryagin maximum principle, symmetrical body motion braking, time optimal problem

ABSTRACT: Control of the rotary motion of a solid, symmetrical body about its center of mass by means of nozzle-type jet engines is studied. Determination of two modes of operation of jet engines is considered: a) braking the velocity of the body in the shortest time (the expenditure of fuel is not given) and b) braking the velocity with minimal fuel expenditure (the time is not given). The analysis is carried out under the assumptions that the jet engines produce control moments m_x, m_y, and m_z about the principal axes of inertia of

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ACCESSION NR: AP4043292

the body and that with the expenditure of fuel the moments of inertia of the body do not change. In the first case, to determine the law of variation of m_x, m_y, and m_z under which the angular velocity components ω_x, ω_y, ω_z (in the article they are considered as phase coordinates) assume the prescribed values in the shortest time, the system of differential equations describing the rotary motion of the body and the system of differential equations for the phase impulses p_x, p_y, and p_z are written. On the basis of the maximum principle of Pontryagin the optimal law for the variation of control moments is determined and the integration of the systems of equations is carried out. Integrals for phase coordinates and impulses are derived which make it possible to determine theoretically the optimal mode for braking the velocity of the body. On the basis of derived integrals it is established that the phase trajectory is a spiral space curve with a variable radius of curvature and a variable step, which winds around the ω_z-axis. A similar procedure is used for determining the phase coordinates and phase impulses in the second case. From the analysis of the derived integrals it follows that in the first case all three control moments act in reverse until complete braking is achieved ($\omega_x = \omega_y = \omega_z = 0$) and in the second case the transversal

Card 2/3

ACCESSION NR: AP4043292

control moments m_x and m_y act alternately, while the longitudinal moment (in the direction of the axis of symmetry of the body) acts permanently until the longitudinal component of the angular velocity of the body becomes equal to zero. As a particular case, the elimination of the precession motion of the body when the longitudinal velocity component is constant is studied. The construction of phase trajectories is given. Orig. art. has: 2 figures and 51 formulas.

ASSOCIATION: none

SUBMITTED: 140ct63 ATD PRESS: 3093 ENCL: 00

SUB CODE: PR, MA NO REF SOV: 002 OTHER: 001

Card 3/3

ACC NR: AP6028317 SOURCE CODE: UR/0040/66/030/004/0625/0635

AUTHOR: Smol'nikov, B. A. (Leningrad)

ORG: none

TITLE: Motion of a solid body with rotating flywheels around the mass center

SOURCE: Prikladnaya matematika i mekhanika, v. 30, no. 4, 1966, 625-635

TOPIC TAGS: motion mechanics, solid body rotation, Volterra ~~problem, flywheel, body system~~

ABSTRACT: An analysis is made of the particular case of the Volterra problem (the problem of rotation of a solid body around the center of mass in the case when some stationary cyclic rotations which do not change the distribution of mass of the body are taking place inside the body) when the rotating solid body is dynamically axially symmetric and a system of flywheels rotating at constant velocity relative to the rotating body is placed inside the body. Under the assumption that the angular momentum of the system during the motion is constant (no external disturbing forces), a system of differential equations with the Euler angles φ, θ, ψ, as principal variables is written to describe the motion of the system and the energy integral is derived. From the equations of motion utilizing the energy integral, the following equation is derived:

$$\left(\frac{d\cos\theta}{dt}\right)^2 = -R^2 f_1(\theta) f_2(\theta), \quad (1)$$

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ACC NR: AP6028317

where $f_1(\theta)$ and $f_2(\theta)$ are particular functions important in analyzing the motion of a system. The results from an analysis of this equation revealed the geometry of the motion. The possible modes of motion of the system are indicated and their dependence on the parameters and initial conditions of the system are established. It is shown that the trajectory of the axis of symmetry of the body describes loop-like curves on the surface of a unit sphere similar to corresponding curves of the Lagrange problem. Orig. art. has: 56 formulas. [LK]

SUB CODE: 20/ SUBM DATE: 27Sep65/ ORIG REF: 003/ OTH REF: 002/ ATD PRESS: 5058

Card 2/2 11b

S/169/62/000/007/069/149
D228/D307

AUTHOR: Smol'nikov, B. M.

TITLE: Profiling by the method of mean gradients

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 7, 1962, 32, abstract 7A211 (V sb. Razved. i promysl. geofiz., no. 41, M., 1961, 74-75)

TEXT: Equipment for the method of mean gradients is described. Its distinctive feature is the presence of two supplying and two receiving lines. The advantage of this equipment is that it is possible to measure the potential difference over a large profile interval without shifting the supply lines. [Abstracter's note: Complete translation.]

Card 1/1

GOLOVTSYN, V.N.; SMOL'NIKOV, B.M.

Method of the charged body in the study of underground waters in the Crimean Mountains. Geofiz. sbor. no.7:153-154 '64. (MIRA 17:11)

1. Institut geofiziki AN UkrSSR.

SAPUZHAK, Ya.S.; SHOL'NIKOV, B.M.

Some features in the use of electric prospecting to study karsts in the Crimean Mountains. Geofiz. sbor. no.3:35-40 '62. (MIRA 15:9)

(Crimean Mountains—Karst) (Electric prospecting)

SMOL'NIKOV, B.M.

Efficient section of isoohms for electric prospecting maps. (MIRA 15:9)
Geofiz. sbor. no.3:49-53 '62.
(Electric prospecting—Maps) (Karst)

SMOL'NIKOV, B.M.

Depth of exploration in prospecting by curvilinear electric profiling. Geofiz.sbor. no. 5:68-70 '63.

Use of underground electric prospecting in cave exploration. Ibid.:71-74 (MIRA 17:5)

1. Institut geofiziki AN Ukr SSR.

SMOL'NIKOV, B.M. [Smol'nykov, B.M.]

Physicogeological conditions governing the geoelectrical study of karst phenomena in the Crimean Mountains. Dop. AN URSR no.7: 959-961 '64. (MIRA 17:9)

1. Institut geofiziki AN UkrSSR. Predstavleno akademikom AN UkrSSR S.I.Subbotinym.

GOLOVTSYN, V.N.; IVANOV, B.N.; SMOL'NIKOV, B.M.

Some karstic and geophysical investigations of the runoff intake zones in the karsts of the Crimean Mountains. Geofiz. sbor. no.7: 142-146 '64. (MIRA 17:11)

1. Institut geofiziki AN UkrSSR.

PRIVAL'SKIY, Boris Yakovlevich; SMOL'NIKOV, L.P., redaktor; KOVALENKO, N.I., tekhnicheskiy redaktor.

[Automatic control of rolling mill electric drives] Avtomaticheskoe upravlenie elektroprivodami prokatnykh stanov. Sverdlovsk, Gos. nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1954. 241. [Microfilm] (MLRA 8:5)

(Automatic control) (Electric driving) (Rolling mill machinery)

POLTEV, Vladimir Kirillovich; SMOL'NIKOV, Lev Petrovich; SHPUNBERG, Ya.N. kandidat tekhnicheskikh nauk, retsenzent; KEL'NIK, V.P., redaktor; BELYAYEV, M.V., kandidat tekhnicheskikh nauk, redaktor; KOVALENKO, N.I., tekhnicheskiy redaktor

[Electrical equipment for metallurgical shops] Elektrooborudovanie metallurgicheskikh tsekhov. Sverdlovsk, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii. 1954. 486 p.(MLRA 8:5)
(Metallurgical plants--Electric equipment)

POLTEV, Vladimir Kirillovich; SMOL'NIKOV, L.P., redaktor; KEL'NIK, V.P. redaktor; KOVALENKO, N.I., tekhnicheskiy redaktor.

[Electrician of the metallurgical shop] Elektrik metallurgicheskogo tsekha. Izd. 2-e, perer. i dop. Sverdlovsk, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, Sverdlovskoe otd-nie, 1955. 244 p. (MLRA 8:8)
(Metallurgical plants--Electric equipment)

PHASE I BOOK EXPLOITATION 729

Poltev, Vladimir Kirillovich, and Smol'nikov, Lev Petrovich

Spravochnoye rukovodstvo elektrika metallurgicheskogo zavoda (Reference Manual for Electricians in Metallurgical Plants) Sverdlovsk, Metallurgizdat, 1955. 456 p. 17,000 copies printed.

Eds.: Zotov, N.P., Burde, L.V., and Krapivin, B.G.; Ed. of Publishing House: Kel'nik, V.P.; Tech. Ed.: Kovalenko, N.I.

PURPOSE: This monograph is addressed to electricians working in metallurgical factories.

COVERAGE: The book gives technical data and characteristics of electrical equipment and apparatus widely used in metallurgical plants. Practical information on the design, selection and operation of electrical equipment and apparatus is given. The book contains, in addition to general discussions of equipment, data on the operation, adjustment, and testing of such equipment and apparatus. In composing the book, the authors have taken into consideration the fact that at present there is being used in metallurgical plants equipment no longer produced by the electrical equipment

Card 1/2

SMOL'NIKOV, L.P.

25(1) PHASE I BOOK EXPLOITATION SOV/1710

Poltev, Vladimir Kirillovich, and Lev Petrovich Smol'nikov

Elektrooborudovaniye osnovnykh tsekhov metallurgicheskikh zavodov (Electric Equipment of the Principal Shops of Metallurgical Plants) 2nd ed., rev. and enl. Sverdlovsk, Metallurgizdat, 1957. 519 p. 14,000 copies printed.

Ed.: L.A. Varnachev; Ed. of Publishing House: V.P. Kel'nik; Tech. Ed.: Ye.M. Zef.

PURPOSE: This is a textbook for schools and courses for master electricians in metallurgical plants. It may also be of use to engineers and technicians concerned with the operation of electrical equipment in metallurgical plants.

COVERAGE: The authors explain the theory of electric drives and describe operating principles and construction details of electric machines and apparatus of electric drives in metallurgical plants. They also describe automatic control systems for electric drives. This is the second edition of the book which has been revised and enlarged. The authors thank the power engineering personnel of

Card 1/

SVOL'NIKOV, L. P., Cand Tech Sci (diss) -- "A method of developing systems of optimal control of the rate of rolling on reversing stands". Leningrad, 1959. 14 pp (Min Higher and Inter Spec Educ RSFSR, Leningrad Electrical Engineering Inst im V. I. Ul'yanov (Lenin)), 200 copies (KL, No 11, 1960, 134)

28.1000,25.2000

77150
SOV/148-59-9-20/22

AUTHOR: Smol'nikov, L. P. (Engineer)

TITLE: Concerning the Problem of an Optimal Control System for the Main Drive of a Reversing Mill

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, 1959, Nr 9, pp 171-177 (USSR)

ABSTRACT: The author sutdies optimal conditions for the control of the main drive of a computer-equipped reversing mill. It is assumed that the control system for the main drive is an element of the automation complex of the rolling mill; consequently, rolling conditions which would ensure maximum productivity of the mill as well as the required quality of the rolled product at a given reduction had to be determined. The author investigated the following: (1) rational graphs of rolling speeds were studied experimentally as well as theoretically under the assumption that the control system of the main drive has been predetermined. The determination of the optimal rates of changes in rolling

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where M_{max} = maximum moment of motor in ton-m; M_c = = moment of static resistances equaling the sum of the rolling moment and the moment of idle motion of the mill in ton-m, GD^2 = moment of inertia of the drive in ton-m^2; (2) Speeds of bite (n_b) and ingot ejection (n_e) have been discussed at numerous occasions, although no unanimous opinion prevails on the subject. For a rational selection of values n_b and n_e the author analyzes the limitations imposed by the power of the motor. The velocity graph for one pass is assumed to be trapezoidal. During the standstill the reversing occurs at speeds which change rectilinearly. Equivalent moment M_e is determined for one pass according to the equation:

$$M_e^2(t_m + t_0) = (M_c + M_a)^2 t_a + M_c^2 t_y + (M_c - M_b)^2 t_b + M_{b_u}^2 t_u \,. \qquad (2)$$

where M_a, M_b, M_{b_o} = dynamic moments during acceleration with ingot, slowdown with ingot, and reversing during standstill, respectively. By means of mathematical calculations and substitutions the speed of bite was determined as:

$$n_b = \left(1 + \frac{M_a}{M_c}\right)^2 n_n \,, \tag{8}$$

and the speed of ejection as

$$n_e = \frac{(M_c - M_b)^2 - 2n_{st}\frac{b}{t_0}\left(\frac{GD^2}{375}\right)^2}{M_c^2 + 2n_{st}\frac{b}{t_0}\left(\frac{GD^2}{375}\right)^2} \quad n_n < \left(1 - \frac{M_b}{M_c}\right)^2 n_n . \tag{9}$$

$$n_{bi} = f_1(\Delta h_i ; \quad B_i ; \quad D_{pi} ; \quad N_i) . \qquad (10)$$

Here Δh = reduction, B = width of ingot, D_p = working diameter of rolls, N = serial number of roll pass. Considering that $t_o(i + 1) = t_{sm}(i + 1) = F(\Delta h_{i+1})$ the optimal speeds of ejection in passes without edging are expressed as follows:

$$n_{ei} = f_2(\Delta h_{i+1} ; \quad D_{pi} ; \quad \rho ; \quad k) \qquad (11)$$

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Concerning the Problem of an Optimal Control System for the Main Drive of a Reversing Mill

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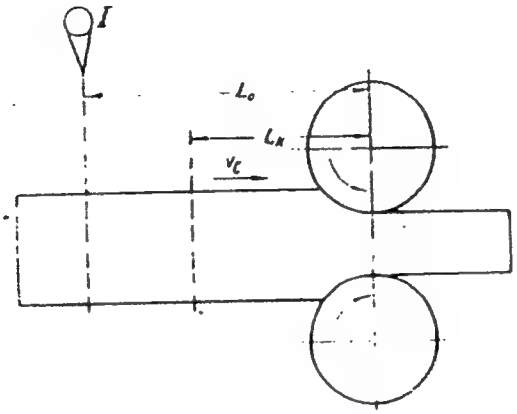

Fig. 2. Diagrammatic representation of a reversing mill: (I) indicator of position of metal; (L_k) length of the ingot part which has not been rolled; (L_o) distance between roll axes and indicator; (v_c) speed of the rear of the ingot.

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so that the speed of the rolls equals n_b at the moment when the ingot returns to the rolls. By means of calculus of variations the author found that the rectilinear changes in the speed during the standstill correspond to a minimum heating of the motor. The character of the speed curve is suitable for purposes of automation; (4) Main drive requirements: the control system must allow slowdown with the ingot, and also reversing during the standstill with constant acceleration which can be predetermined. Acceleration with the ingot should be integrated in the speedup function so that a speedup rate permissible under conditions of the motor load would be ensured for each pass. The necessary estimation of the possible static load is done according to ingot temperatures or the load in the preceding pass. The rate of speedup in each pass can be programmed. In selecting parameters for the control system values μ and Δt, ($\mu = \frac{\Delta t}{t}$ where Δt = time necessary for the setting

Concerning the Problem of an Optimal Control System for the Main Drive of a Reversing Mill

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of the predetermined deceleration slowdown in sec) should be decreased in order to facilitate operations as well as to diminish errors δ_{n_e} and δ_{n_b} (δ_n = maximum value of relative error). There are 4 figures; and 6 Soviet references.

ASSOCIATION: Leningrad Electrotechnical Institute (Leningradskiy elektrotekhnicheskiy institut)

SUBMITTED: April 17, 1959

Card 10/11

Concerning the Problem of an Optimal Control System for the Main Drive of a Reversing Mill

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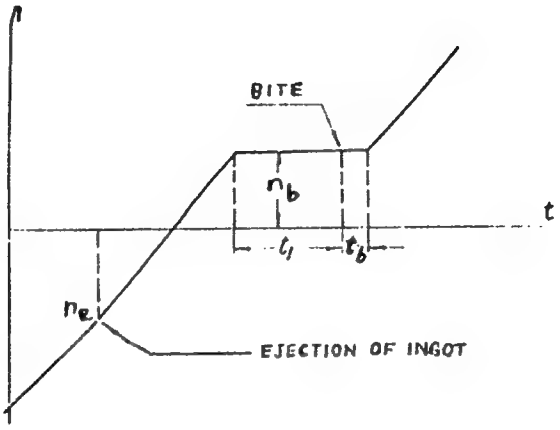

Fig. 4. Speed diagram of rolling during acceleration: (n_b) speed of bite; (n_e) speed of ejection.

Card 11/11

PHASE I BOOK EXPLOITATION SOV/4250

Smol'nikov, Lev Petrovich

Elektroavtomatika tekhnologicheskikh protsessov v metallurgicheskikh tsekhakh (Electric Automation of Manufacturing Processes in Metallurgical Plants) Sverdlovsk, Metallurgizdat, 1960. 207 p. Errata slip inserted. 3,150 copies printed.

Reviewer: A. V. Fateyev; Ed.: B. N. Dralyuk; Ed. of Publishing House: V. P. Kel'nik; Tech. Ed.: R. M. Matlyuk.

PURPOSE: This book is intended for electricians at metallurgical plants and technicians working in automation laboratories in the metallurgical industry. It can also be useful to students specializing in automation at tekhnikums.

COVERAGE: The author examines special automation devices such as transducers and computers (both discrete and continuous) and other special apparatus used in automating metallurgical plants. He also discusses the automation of basic equipment used in blast furnaces, steel-making plants, and rolling mills. In compiling this book the author drew upon published literature and his own

Card 1/5

Mezhvuzovskoye ob"yedinennoye soveshchaniye po avtomatizatsii proizvodstvennykh protsessov v mashinostroyenii i avtomatizirovannomu elektroprivodu v promyshlennosti. 3d, Moscow, 1959

Elektroprivod i avtomatizatsiya promyshlennykh ustanovok; trudy soveshchaniya (Electric Drive and Automation in Industrial Systems; Transactions of the Conference) Moscow, Gosenergoizdat, 1960. 470 p. 11,000 copies printed.

General Eds.: I.I. Petrov, A.A. Sirotin, and M.G. Chilikin; Eds.: I.I. Sud, and E.P. Silayev; Tech. Eds.: K.P. Voronin, and G.Ye. Larionov.

PURPOSE: The collection of reports is intended for the scientific and technical personnel of scientific research institutes, plants and schools of higher education.

COVERAGE: The book is a collection of reports submitted by scientific workers at plants, scientific institutes and schools of higher education at the third Joint All-Union Conference on the Automation of Industrial Processes in Machine Building and Automated Electric Drives in Industry held in Moscow on May 12-16, 1959. The Conference was called by the Academy of Sciences USSR, the Gosplan SSSR (State Planning Commission USSR), the GNTK SSSR, the Gosudarstvennyy Komitet po avtomatizatsii i mashinostroyeniyu (State Committee on Automation and Machine Building) and the Natsional'nyy komitet SSSR po avtomaticheskomu upravleniyu (USSR National Committee on Automatic Controls) and prepared by the Nauchno-tekhnicheskiy komitet po avtomatizirovannomu elektroprivodu (Scientific and Technical Committee on Automated Electric Drives), the MEI (Moscow Institute of Energetics), the VNIIEM, the IAT (Institute of Automation and Telemechanics) of the Academy of Sciences USSR, and the Komissiya po tekhnologii mashinostroyeniya Instituta mashinovedeniya AN SSSR (Commission on the Technology of Machine Building of the Institute of Science of Machines of the Academy of Sciences USSR). It was the purpose of the Editorial Board to arrange the reports in a way which would ensure a relatively systematic presentation of theoretical and practical problems relating to electric drives and automatic controls of industrial mechanisms used in various branches of industry. Basic problems of automated electric drive and their solution are outlined. The book also contains articles on electric machinery and means of automation. Considerable attention is paid to noncontact automatic control systems, including systems with semiconductor devices and magnetic amplifiers, and to computers intended both for the analysis and the synthesis of linear and nonlinear automatic regulation and control systems. Reports already published in journals or official publications have been considerably abbreviated; those which have appeared in volume V of MEI EP transactions or in the journal "Elektrichestvo" are marked with an asterisk. No personalities are mentioned. References accompany some of the papers.

PART I. GENERAL PROBLEMS CONCERNING THE THEORY AND PRACTICE OF ELECTRIC DRIVE AND AUTOMATION OF CONTROL

SMOLNIKOV, L.P.

POLTEV, Vladimir Kirillovich; SMOL'NIKOV, Lev Petrovich; VARNACHEV, L.A., red.; KRYZHOVA, M.L., red.izd-va; MATLYUK, R.M., tekhn.red.

[Reference manual for electricians of metallurgical plants] Spravochnoe rukovodstvo elektrika metallurgicheskogo zavoda. Izd.2., ispr. i dop. Sverdlovsk, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, Sverdlovskoe otd-nie, 1960. 511 p. (MIRA 13:12)
(Metallurgical plants--Electric equipment)
(Electricians--Handbooks, manuals, etc.)

SMOL'NIKOV, L.P., inzh.

Question on optimum conditions of velocity for automatically controlled reversing hot rolling mills. Izv. vys. ucheb. zav.; energ. 3 no.8: 27-34 Ag '60. (MIRA 13:9)

1. Leningradskiy elektrotekhnicheskiy institut imeni V.I. Ul'yanova (Lenina). Predstavlena kafedroy avtomatiki i telemekhaniki.
(Rolling mills) (Automatic control)

S/146/61/004/005/005/011
D221/D305

16,8000 (1031, 1103, 1329)

AUTHORS: Salkani, D. and Smol'nikov, L.P.

TITLE: Calculating the tuning parameters for a relay regulator with a rigid feedback, operating in intermittent conditions

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Priborostroyeniye, v. 4, no. 5, 1961, 66-75

TEXT: An analysis is given of the intermittent operation of a relay controlling slow processes, the arrangement of which is shown in Fig. 1. The object of its control K, is an aperiodic link of the first order with a time constant T_1, for regulating the parameter θ. The control organ CO is actuated by an executive organ EO having a constant speed of rotation. The regulator consists of a relay amplifier P and measuring ridge M. The chopper C switches in the regulator periodically. The author formulates initial equations, considering the chopper as closed, and assuming that the time

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constant of the executive organ and of it is smaller than T_k. To determine the increment of parameter $\Delta\theta_{sr}$ it is assumed that $\theta = \theta^{o}_{s.r}$ when there is not control. The value of $\Delta\theta_i$ which characterizes the lack of sensitivity (i = insensitivity) of the regulator is given by $\Delta\theta_i = \frac{k}{k + k_o} \cdot \frac{u_{sr}}{k_n}$. This is followed by analysis of step changes in the emitting agent. After mathematical elaborations a set of equations is deduced for the relay function, F(z), where $z = x + \gamma \frac{dx}{dr}$, and $x = \frac{\Delta\theta - \Delta\theta^{o}_{n}}{\Delta\theta_n}$, $\tau = \frac{t}{T_k}$. The automatic control system is then analyzed with the aid of a three-chart phase plane. In case of thermal energy and chemical objects, $\Delta\theta \ll \theta_k$, and therefore, $x \ll \xi$, as well as $y \ll \xi$. Consequently, it is possible to make the approximation $\frac{dx}{dy} = 0$, and then the phase trajectories in charts II and III are vertical lines. Equations of lines on which phase trajectories pass from one chart to another

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are deduced. Two diagrams of point transformation are given which permit analysis of the automatic control for various initial conditions (one diagram is for closed chopper, the other for interrupting operation of the regulator). Possibilities of a damped transition process and self-oscillations are discussed. The diagram of point transformation allows calculation of the period and plotting the transition process in the case of a step change in the disturbing effect. This article was recommended by the Kafedra avtomatiki i telemekhaniki (Department of Automation and Telemechanics). There are 5 figures and 3 Soviet-bloc references.

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V.I. Ul'yanova (Lenina) (Leningrad Electrotechnical Institute im. V.I. Ul'yanov (Lenin))

SUBMITTED: March 8, 1961

30480

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Fig. 1. Block diagram of the automatic control system: M - measuring bridge; 2 - chopper; 3 - relay; 4 - executive organ; 5 - control organ; k - control object; 6 - measuring instrument.

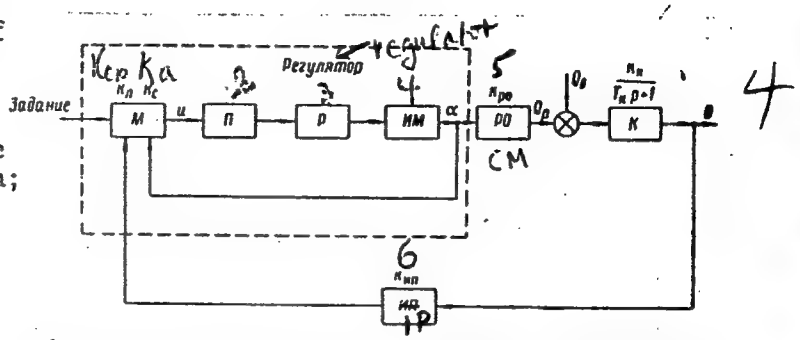

Рис. 1. Структурная схема системы автоматического регулирования:
М — измерительный мост; *П* — прерыватель; *Р* — реле; *ИМ* — исполнительный механизм; *РО* — регулирующий орган; *К* — объект регулирования; *ИП* — измерительный прибор

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SMOL'NIKOV, LEV PETROVICH, kand.tekhn.nauk, assistent

Use of nonunitary feedback in designing optimum control systems for electric motors. Izv. vys. ucheb.zav.; elektromekh. 4 no.7:41-49 '61. (MIRA 14:7)

1. Kafedra avtomatiki i telemekhaniki Leningradskogo elektrotekhnicheskogo instituta.
(Electric motors) (Automatic control)

S/194/62/000/012/037/101
D201/D308

AUTHOR: Smol'nikov, L. P.

TITLE: Determination of the appropriate rate of ingot ejection from the rollers in automatic reversible machine rolling

PERIODICAL: Referativnyy zhurnal, Avtomatika i radioelektronika, no. 12, 1962, 80, abstract 12-2-160 s (Izv. Leningr. elektrotekhn. in-ta, no. 46, 1961, 118-127)

TEXT: In order to obtain maximum productivity of a reversible machine in automatic rolling the duration of operation of clamping arrangement, the return time t_o of the ingot ejected from the rollers for the next passage and the reversing time of the machine drive must be equal to each other. The dependence of t_o on the rate of ejection n_b of ingots from the rollers was investigated on a 1500 mm blooming and a 900 mm clamping bench. It was established

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that $t_o = k_o n_b$, where k_o - a coefficient of proportionality depending on the sliding friction coefficient of metal against the roll train and on the working diameter of the rollers. In blooming rolling of 300 x 320 mm ingots, k_o for various passages differs from the mean value by not more than ± 2 to 3%. For establishing the dependence between t_o and n_b it is possible to use the values of k_o as determined for the rolling cycle as a whole. There is a correlation between t_o and n_b, its coefficient being 0.88. The suitable rate of ingot ejection is determined for the i-th passage by the expression $n_{bi} = k_{ca}\sqrt{\Delta h_{i+1}/k_o}$, where k_{ca} is a constant coefficient characterizing the performance of the clamp; Δh - the value of clamping force. From this expression, in which k_o has the experimentally determined value, the rate of ejection may be evaluated beforehand and introduced into the automatic process as a program, or it may be found automatically during the rolling pro-

Determination of the ...

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cess. k_o can change during the working process and requires, therefore, automatic adjustment. 2 figures. 2 tables. 4 references. [Abstracter's note: Complete translation.]

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BRAZHNIKOV, Nikolay Vasil'yevich; BONDARENKO, Vladimir Ivanovich; CHISTOV, Villen Petrovich; DRALYUK, B.N., retsenzent; SMOL'NIKOV, L.P., red.; BUR'KOV, M.M., red. izd-va; KOROL', V.P., tekhn. red.

[Automatic control of blast furnace and rolling mill processes with use of digital computers] Avtomatizatsiia domennogo i prokatnogo proizvodstva s primeneniem tsifrovykh schetno-reshaiushchikh ustroistv. Sverdlovsk, Metallurgizdat, 1962. 256 p. (MIRA 15:12)

(Blast furnaces) (Rolling mills)
(Electronic digital computers)

SMOL'NIKOV, L.P., dotsent

Optimum relative switching duration for the electric drives mechanisms of rolling mills. Izv. LETI no.47:171-180 '62.
(MIRA 16:12)

PCLTEV, Vladimir Kirillovich[deceased]; SMOL NIKOV, Lev Petrovich, CHAPAYKINA, F.K., red.izd-va; MIKHAYLOVA, V.V., tekhn.red.

[Electrical equipment of the main departments of metallurgical plants] Elektrooborudovanie osnovnykh tsekhov metallurgicheskikh zavodov; posobie dlia podgotovki masterov. Izd.3., ispr i dop. Moskva, Metallurgizdat, 1963. 595 p. (MIRA 16:10)

(Iron and steel plants--Electric equipment)

SMOL'NIKOV, L.P. (Leningrad); BYCHKOV, Yu.A., (Leningrad); VOLKOV, Ye.F. (Leningrad)

Study of a third-order automatic control system optimum in respect to the sense of braking time with stabilized speed. Izv. AN SSSR. Tekh. kib. no.5:157-163 S-O '63. (MIRA 16:12)

SMOL'NIKOV, L.P. (Leningrad); KOTCHENKO, F.F. (Leningrad)

Automatic control system optimum in respect to response time with an asynchronous executive motor. Izv. AN SSSR. Tekh. kib. no.6: 46-53 N-D '63. (MIRA 17:4)

ACCESSION NR: AR4014682 S/0271/64/000/001/A025/A025

SOURCE: RZh. Avtomatika, elecmekhanika i vy*chislitel'naya tekhnika, 1964, no. 1, Abs. 1A168

AUTHORS: Balkani, Derd', and Smol'nikov, L. P.

TITLE: Approximate diagram of point transformation and its use for the study of relay control of slow processes

CITED SOURCE: Izv. Leningr. elektrotekhn. in-ta, vy*p. 48, 1963, 212-226

TOPIC TAGS: automatic control, relay control, slow process, slow process control, adaptive control system, self-adaptive control system, relay control system, automatic control system

TRANSLATION: A self-adaptive control system (SCS) is examined consisting of 1) a relay control (R) having a constant-rate regulator and a rigid feedback and 2) an object described by an equation which holds for an aperiodic unit with a long time constant. Equations are derived for describing SCS operation, and the operation is then investigated in terms of a three-sheeted phase plane. Simplified phase trajectories are drawn for slow processes. An approximate diagram of the

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ACCESSION NR: AR4014682

point transformation is constructed and used to find the motion of the system for various initial conditions. Together with the usual (single point) mode of R operation, multipoint modes are studied in which a single R is used to control a number of objects. In this case the R operates intermittently. This mode of operation is also studied with the aid of the point transformation diagram. Conditions are determined under which self-oscillation occurs, and parameters are found for the limit cycle. When relay delay is considered, the region of the initial conditions under which self-oscillation occurs becomes larger. Relations are obtained for calculating the tuning of the R which assures a tolerable static control error and an appropriate transient process. Orig. art. has 6 figs. and 3 refs. A. L.

SUB CODE: GE ENCL: 00 DATE ACQ: 19Feb64

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S/146/63/006/001/002/014
D201/D308

AUTHORS: Balkani, D. and Smol'nikov, L. P.

TITLE: Calculation of tuning parameters of a multi-point proportional relay regulator for an object with delay

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Priborostroyeniye, v. 6, no. 1, 1963, 27-37

TEXT: Assuming a slow-varying process, the authors analyze the performance of a proportional relay regulator of an object represented by an aperiodic element with delay for the case of a single- and multi-point control state. The design of the regulator is deduced from a three-sheeted phase plane and an approximate diagram of the conformal mapping. The expressions derived give the conditions of stability, damped and natural oscillations of the system. Conclusion: the phase plane method should be used for the analysis of the motion of an automatic control system when it is necessary to take into account the limited positioning of the regulating element. There are 4 figures.

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Calculation of tuning ...

S/146/63/006/001/002/014
D201/D308

ASSOCIATION: Leningradkiy elektrotekhnicheskiy institut im. V. I. Ul'yanova (Lenina) (Leningrad Institute of Electrical Engineering im. V. I. Ul'yanov (Lenin))

SUBMITTED: April 24, 1962

Card 2/2

B K

ACCESSION NR: AP4039388 S/0144/64/000/005/0527/0537

AUTHORS: Smol'nikov, Lev Petrovich (Candidate of technical sciences, Docent)

TITLE: On the application of the invariance principle to the synthesis of correcting devices for automatic regulation systems

SOURCE: IVUZ. Elektromekhanika, no. 5, 1964, 527-537

TOPIC TAGS: automatic control design, automatic control theory, automatic regulation, frequency response characteristic, compensating network

ABSTRACT: An algebraic method is proposed for the synthesis of correcting networks, suitable for automatic systems with complicated structural block diagrams, where the method of logarithmic frequency response functions cannot be readily used. If the transfer function of the automatic system is

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$$K(p) = \frac{x(p)}{z(p)} = \Phi(p) \cdot \frac{1}{F(p)} = \frac{b_0 + b_1 p + b_2 p^2 + \ldots}{a_0 + a_1 p + a_2 p^2 + \ldots},$$

and the error signal transform is

$$\Phi_\varepsilon(p) = \frac{\varepsilon(p)}{z(p)} = K(p) - 1 = \frac{(b_0 - a_0) + (b_1 - a_1)p + (b_2 - a_2)p^2 + \ldots}{a_0 + a_1 p + a_2 p^2 + \ldots}$$

then the synthesis of an equivalent corrected system (with minimized error) reduces to an evaluation of certain invariance coefficients, which are determined from the coefficients of the numerator and denominator of the transfer function K(p). The procedure for determining the coefficients is indicated and the method is employed, by way of an example, to synthesize a parallel correcting network. The choice of the transfer function to satisfy certain quality indices is illustrated, and a numerical example is given. Orig. art. has: 5 figures, 21 formulas, and 1 table.

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ACCESSION NR: AP4039388

ASSOCIATION: None

SUBMITTED: 30Nov61 DATE ACQ: 19Jun64 ENCL: 00

SUB CODE: IE NR REF SOV: 002 OTHER: 000

Card 3/3

KOTCHENKO, F.F. (Leningrad); SHOL'NIKOV, L.P. (Leningrad)

Optimal control of an automatic system with nonlinear mechanical characteristic of the servo motor. Avtom. i telem. 26 no.11:2051-2053 N '65. (MIRA 18:12)

1. Submitted January 14, 1965.

ACC NR: AP7000285 (A) SOURCE CODE: UR/0143/66/000/011/0090/0093

AUTHORS: Smol'nikov, L. P. (Candidate of technical sciences, Docent); Sofronov, V. G. (Engineer); Volkov, Ye. F. (Engineer); Bychkov, Yu. A. (Engineer)

ORG: Leningrad Electrical Engineering Institute im. V. I. Ul'yanov (Lenin) (Leningradskiy elektrotekhnicheskiy institut)

TITLE: An optimal digital servo system

SOURCE: IVUZ. Energetika, no. 11, 1966, 90-93

TOPIC TAGS: servosystem, optimal automatic control, rolling mill, digital system, electric motor, trigger circuit, magnetic amplifier, electronic feedback, second order differential equation / DP-42 electric motor

ABSTRACT: A brief description of a digital servo system for automatic control of the clamping device on a sheet rolling mill is presented. The servo system (see Fig. 1) uses an electromagnetic shaft position-to-digital converter (SDC) as the pickup of the true position of the upper roller B. An arithmetic device (AD) continuously calculates the difference $\varepsilon = A - B$ between the assigned position of the upper rollers A and B. The positive or negative difference (obtained in binary code) is converted to a voltage proportional to this difference by code-to-voltage converters (CVC) Near-to-optimum response speed of the system can be achieved by using strong linear motor-speed feedback. An experimental study performed directly on a mill

Card 1/2

UDC: 62—503.53

L 6992-66

ACC NR: AP5026807 SOURCE CODE: UR/0286/65/000/017/0090/0090

INVENTOR: Moin, V. S.; Nezhdanov, I. V.; Smol'nikov, L. Ye.; Laptev, N. N. 35 B

ORG: none

TITLE: A semiconductor switch. Class 42, No. 174434

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 17, 1965, 90

TOPIC TAGS: semiconductor device, electric switch

ABSTRACT: This Inventor's Certificate introduces a semiconductor switch based on a *p-n-p-n* structure. Switching time from the "on" to the "off" state is reduced by connecting a diode between the *n*-regions with the anode connected to the *n*-emitter and the cathode connected to the *n*-base, while a second diode is connected between the *p*-regions with the anode connected to the *p*-base and the cathode connected to the *p*-emitter.

SUB CODE: EC/ SUBM DATE: 29Apr62/ ORIG REF: 000/ OTH REF: 000

Card 1/2 UDC: 681.142.07

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ACC NR: AP5026807

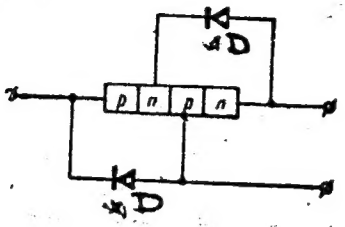

Fig. 1.

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